De Sitter from warped anti-D3-branes?

Ander Retolaza

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1707.08678 by Jakob Moritz, A.R. & Alexander Westphal

De Sitter in String Theory?

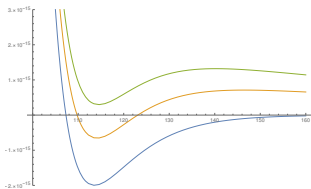In GKP [Giddings, Kachru, Polchinski '01] compactifications, tension between perspectives

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4D EFT (SUGRA) approach to vacua construction

[Kachru, Kallosh, Linde, Trivedi '03]

- Moduli stabilization by fluxes & non-perturbative effects: AdS_4
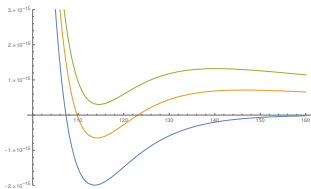- Controlled uplift: localized ~~SUSY~~ ($\overline{D3}$-brane on warped throat)

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10D General Relativity

[Maldacena, Núñez '00]

Warped compactification ansatz:

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- De Sitter possible if $T^\mu_\mu > T^m_m$
- Exist in string theory, but problematic for GKP backgrounds
- $\overline{D3}$-branes: $T^\mu_\mu < T^m_m$

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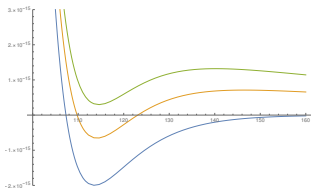- $\overline{D3}$-branes: $T_\mu^\mu < T_m^m$

[Mortiz, AR, Westphal '17] 10D picture of most simple KKLT construction

10D picture of KKLT

Start with 2 derivative Type IIB action. For a *generalized* GKP ansatz:

$$R_4(g^4) \sim \int d^6y \sqrt{g^6} \left[-|\partial(e^{4A} - \alpha)|^2 - e^{8A} \left(\frac{|G_3^{IASD}|^2}{6\text{Im}(\tau)} + \frac{\Delta^{loc}}{2\pi} \right) \right]$$

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We can now follow the KKLT approach:

- Moduli stabilization: fluxes and *one* gaugino condensate $\langle \lambda\lambda \rangle$ ($h^{1,1} = 1$)

  10D description of $\langle \lambda\lambda \rangle$ using [Baumann, Dymarsky, Kachru, Klebanov, McAllister '10]

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Leading order correction to R_4 from re-adjustment of internal geometry:
in the controlled regime a warped **$\overline{D3}$-brane** fails to uplift to de Sitter